NINTENDO 64®

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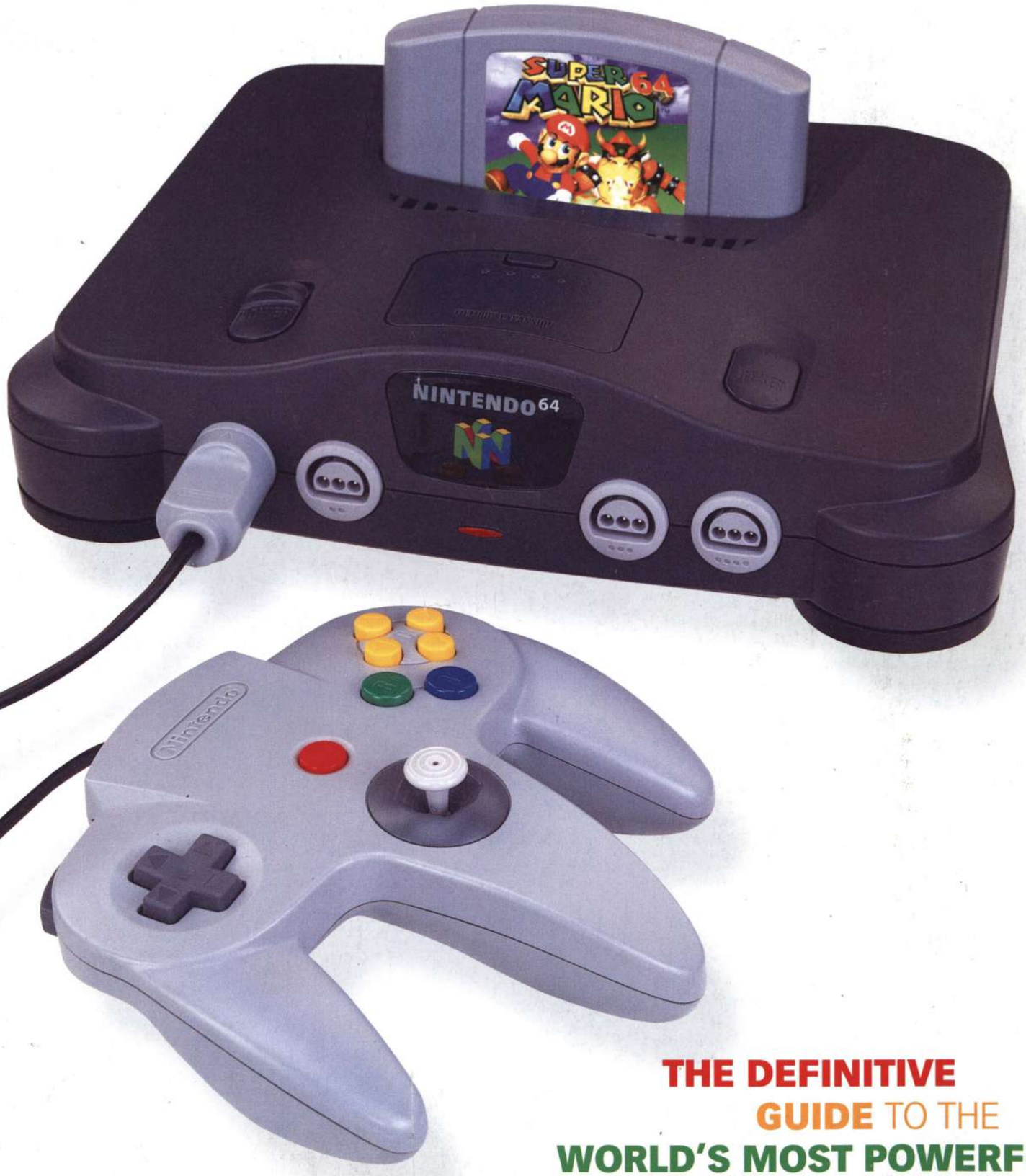

THE DEFINITIVE GUIDE TO THE WORLD'S MOST POWERFUL VIDEOGAME SYSTEM

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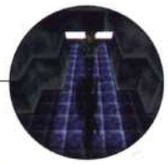

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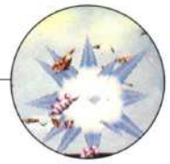
Set to be the first game to make use of Nintendo's revolutionary 64DD unit, *Zelda 64* is the most eagerly awaited Nintendo 64 title for 1997



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The time for waiting is over. After what has seemed like an interminable test of patience, Nintendo's 64bit console is finally hitting UK streets.

This supplement aims to provide an exclusive insight into the technology behind the world's most powerful gamebox and endeavours to assess the implications of 64bit videogaming.

Silicon Graphics' involvement is obviously tantamount in the 64bit equation. Only by applying the expertise gained from years of pioneering work in the field of high-end graphics workstations has a company been able to engineer state-of-the-art realtime technology in a mass-market proposition. Edge speaks to one of the key players in the machine's development, and asks just what makes the Nintendo 64 so different from other next generation consoles.

Edge also gets its hands on the UK machine and details exactly what can be expected from the PAL N64 initiative. What exactly comes with the UK console? Does it inherit the usual barrage of shortcomings associated with PAL machines? Will imported games work on the UK system? The answers to all these questions can be found inside.

Of course, the key to any machine's success is software, and this is an area that Edge has spent much time researching. As well as detailed reviews of the three games appearing at launch (plus two titles expected shortly after), Edge presents details coverage of major titles such as *Legend of Zelda 64* and *Star Fox 64*, as well as casting a net over the most promising selection of other titles set to make waves in the coming year.

It is difficult to predict exactly what impact the Nintendo 64 will have in the UK. But for those who know their videogames, there can be only one gameplay king, and that's Nintendo. Prepare to enter the 64bit era...

Silicon specialists

California-based Silicon Graphics Inc. dominates the high-end computer visuals scene. While the N64 is loosely based on its Onyx Reality Engine² hardware, the company already has a workstation that's 100 times more powerful.

The Onyx InfiniteReality can handle an awesome ten million polygons/sec and can render landscapes (like this Matterhorn scene, bottom) in realtime with stunning accuracy. Of course, there's a price the pay for such leading edge technology – the R4400 series starts at £179,000. Roll on the Nintendo 128...

Nintendo 64: from project to reality

The future began in July 1992. At least as far as videogames are concerned. This was the month that the technology behind the N64 first surfaced. Flouting tradition, however, the development did not take place at Nintendo's HQ in Kyoto, Japan, where both the Famicom and Super Famicom consoles were designed. It did not even take place in Japan. No, the future began in Mountain View, California: home to Silicon Graphics Incorporated.

SGI is, of course, the world's leading computer visuals company. It is most renowned for its range of graphics workstations – used by videogame developers all over the world to build hi-res 24bit 3D models. These machines are both expensive and unrivalled, and it is perhaps the greatest testament to the technical brilliance of N64's internal architecture that most of it could originally be found in one such graphics development system: the Reality Engine.

Unveiled in July 1992, the Reality Engine is packed with scintillating custom components and symbolises the sort of technology that console manufacturers could once only dream of employing in their machines – a situation reflected in the $100,000 price tag. At that time, the system and its desirable innards were all but unattainable.

A few months later, however, **Tim Van Hook**, an engineer at SGI, developed a cheaper version of the Reality Engine called the Multimedia Engine, which could do more or less everything its big brother could. Immediately, **Jim Clark**, then chairman of SGI, set about discussing the Multimedia Engine's potential with videogame machine manufacturers.

Although Sega was also rumoured to be involved in negotiations, Nintendo apparently emerged as the most promising partner and in August 1993 a deal was struck to work on the joint development of a new videogame machine. SGI, with a brief to design and engineer all the internals except memory, set about planning a gamebox capable of generating extremely realistic virtual worlds. In September 1993, work finally began on 'Project Reality', the codename for what was later to become the Nintendo 64.

The development process lasted approximately two more years during which time Nintendo began to recruit its infamous 'Dream Team' – a group of secondparty developers judged talented enough work on N64 titles. Unsurprisingly, the first to sign up was Warwickshire-based softco Rare, which has enjoyed a close relationship with Nintendo since the NES's heyday. DMA Design followed, along with the likes of LucasArts, Angel Studios, Software Creations and Paradigm Simulation. With such important names on board, the N64's burgeoning reputation as an elite machine gained almost unequivocal patronage.

With such important names on board as members of the 'Dream Team', the N64's burgeoning reputation as an elite machine gained almost unequivocal patronage

From here on, Nintendo took a major role in governing how the console was developed. According to former SGI marketing man **George Zachary**, the Japanese game giant brought in game developers throughout the design process, so that SGI could tell them about the abilities and limitations of the proposed machine. Despite this invitation of creative expertise, however, the actual technical development of Project Reality was shrouded in secrecy – a marked contrast to SGI's candid, Californian nature. Internal communication about the machine was minimal and few SGI employees actually knew where the design lab was (although covering its window with a *Donkey Kong Country* poster was probably a bit of a giveaway).

But the genesis of the N64 did not run an entirely smooth course. Although the internal design remained faithful to the original concepts of Nintendo and SGI, the name, look and launch date of the console went through several changes. Ultra 64, for example, was the machine's accepted name tag for months before the more unaffected Nintendo 64 was arrived at.

Eventually, the machine launched in Japan on June 23, 1996, the US in the following September, and in the UK on March 1 this year. After much controversy, doubt and dalliance, Nintendo entered and redefined the console market. The 64bit age had dawned...

The term 64bit is casually bandied about in relation to Nintendo's console as some sort of undeniable signifier of hardware superiority. But just how advanced is the machine, and just how much better than its 32bit rivals does it employ next-gen favourites such as anti-aliasing, texture-mapping and large-scale polygon manipulation?

Edge talked to George Zacharay, while he was still in his marketing position at Silicon Graphics, to find out the truth, the whole truth and nothing but the truth about the technology that powers the Nintendo 64.

Edge: The heart and soul of the N64 is obviously the CPU working in conjunction with a custom graphics chip. Is the N64's CPU a true 64bit chip?

GZ: Oh yes, absolutely, it's a true 64bit chip with all 64bit processing. That CPU by itself literally has Pentium-class performance. And the CPU is used just to calculate the behaviours and the AI and logic of the game. It doesn't touch any of the polygons or pixels or any of the sounds. It's a ton of power for that alone.

Edge: So, much of what is seen on-screen is generated by the graphics processor.

GZ: Right. The reality coprocessor is fantastic. It's also 64bit in nature, but it has 128bit processing internally as well. But we didn't go around hyping it as 128bit – we don't want to get into that ball of confusion. Also, it calculates in two portions: half of it is the reality signal processor, the other part is the reality display processor.

The reality signal processor is what calculates all the geometry transformations [part of the realtime rendering process]. As a result, the N64 has a huge, huge advantage over PCs because they use the CPU to do the geometry transformation. That's a massive weakness because then there's nothing left to run the actual game. And on top of it, a general-purpose RISC or CISC CPU is not the right CPU to use to do geometry transformation. It's just not the right shape of processor. So we developed a signal processor that's specifically suited to doing matrix multiplication and addition, which is heavily used to do geometry transformation in 3D and used to do synthesis and decompression of audio.

Edge: How would you say the N64's graphics processor compares to the custom graphics chips in the PlayStation and Saturn in real terms?

GZ: The Saturn doesn't have any dedicated geometry transform, right off the bat. The PlayStation has got a 32bit multiply adder to handle geometry. It has way lower floating-point operations-per-second performance. I can't characterise it because first, I can't say what our performance is, and second, the Sony number doesn't really... it's all over the place.

The big difference, though, is in the second part of the reality coprocessor's function: the fact that we have this thing called the reality display processor (RDP). What the RDP does is kick out all the really cool-looking pixels that you see. It calculates all the colour, transparency, Z-buffering and texture-mapping info and displays it on the screen. The big value-adder is it's in the RDP that we do all advanced features, like trilinear interpolation, mip-mapping, Z-buffering, perspective-correct textures and the other stuff. Which is completely missing from Sony's hardware.

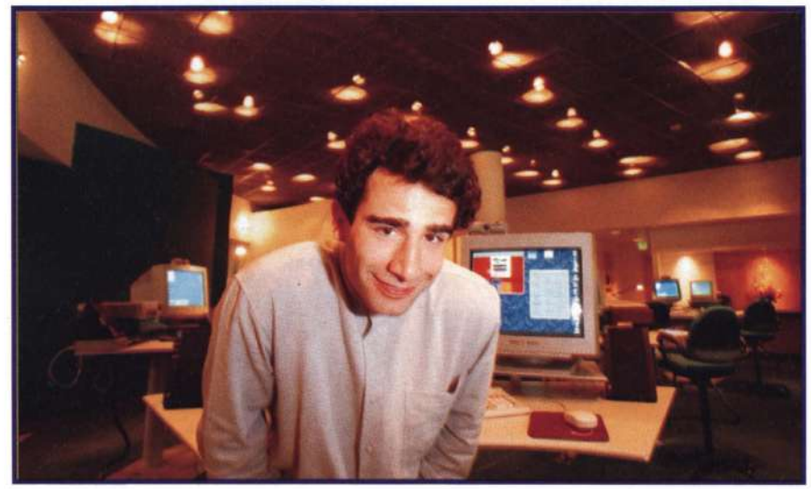
Edge: The N64 has a selection of graphic features and tools which are built into the hardware. Can game developers use these features for 'free'? Can they turn them on with minimal affect on game speed?

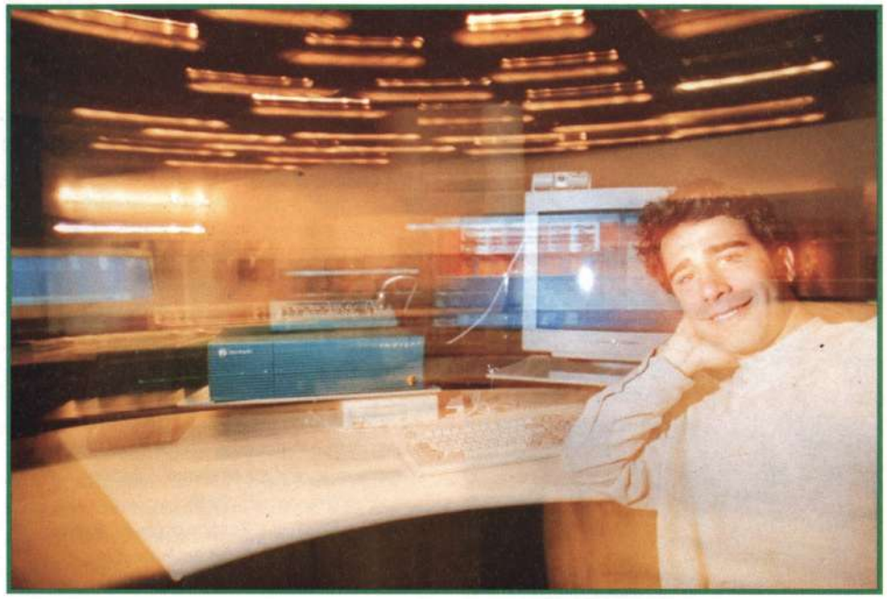
GZ: That's correct. Let's start with anti-aliasing. This is a good feature because it smooths out all the jaggies. The reality of TVs and computer monitors is that pixels are obviously square, and the human eye can see these pixels individually because there aren't enough pixels on a screen to overwhelm the resolution of the eye. Hence, with curved lines, you get a 'stair-stepping' effect – aliasing. With the N64 you can simply compute a colour to put in an adjacent area and achieve a blending effect, eliminating the jaggies.

Edge: What about load management? How does this feature actually work in the N64?

GZ: Load management dynamically tunes the graphic pipeline, so you have sustained frame rate. Because

'The N64 has a huge, huge advantage over PCs because they use the CPU to do the geometry transformation. That's a massive weakness because then there's nothing left to run the actual game'





you kind of build up 'loads' of graphics, it avoids the creation of bottlenecks in the system. Basically, it makes sure that data comes in and goes out at a sustained rate. It works all the way from the CPU, through the reality coprocessor, to memory. So it's kind of a system-wide effect.

Edge: And Z-buffering is also in as standard.

GZ: Yes. What Z-buffering does is it allows you to assign a polygon or an object a location in 3D space – i.e. in the Z-dimension, as well as the X- and Y-dimensions. So in a game that includes, let's say, ships and planes, the system can automatically figure out whether the ship is in front of the plane, and so it automatically knows whether it should be drawing the ship or the plane polygons. If you don't have Z-buffering, what you have to do as a developer is create polygon sort lists which tell the system what polygons are visible and which ones aren't from every angle.

Edge: Which eats up processing speed...

GZ: Not only does it eat up processing speed, but the worst thing about not having Z-buffering is that it's really expensive in terms of development time. Without Z-buffering the game creators basically have to figure out what polygons are viewable from what angles – and this can take forever, especially as games increase in complexity. Developers prefer to spend their time creating a game versus figuring out polygon sort lists.

And it also leads to problems, because sometimes people have to figure out some angle if things are viewable, and they'll just kinda forget about it. The result of this is a player will go into part of the game and all of a sudden see stuff that looks kind of whacked, in terms of sort priority, and see things that don't look like they should.

Edge: What else do you see as the N64's strengths?

GZ: Well, it also has perspective-correct texturing, which basically correctly scales a texture map if it's not parallel with your vision. For example, if there's a billboard that kind of goes off into the distance – say it's on the wall of an alley you are looking down – on the N64, the texture map will be correctly scaled so you don't get any kind of smearing of pixels into the Z-dimension.

Edge: So why include all these features as standard? It seems that Sony's designers pushed the PlayStation in the direction of polygons-per-second count, while it appears that SGI regarded raw polygons-per-second performance as a secondary priority.

GZ: The thing that we found is that people don't necessarily react to more polygons, they react to higher-quality texture mapping. That's one of the lessons we learned with the Reality Engine. The workstation before the Reality Engine was known as the VGX. And although the Reality Engine had roughly the same polygon count as the VGX, the big difference was that the Reality Engine processed way more texture-mapped polygons per second, and the texture mapping was of a much higher quality with a higher pixel-fill performance. So it looked completely different. It's a completely different experience – with roughly the same number of polygons.

Edge: Another advantage of good texture-mapping is that it reduces the need for high polygon count.

GZ: That's exactly correct. I've seen people draw trees that look realistic with a total of four polygons. And by keeping a low polygon count, you allow for a higher frame rate, and people will respond to frame rate as well.

Edge: You've talked about all these graphics features that N64 has. But why not simply give developers more raw processing power so they can harness the complete power of the machine for their own particular goals?

GZ: Well, I can tell you this. Let's suppose you just had a generic processor – such as the CPU in a PC – that could run any kind of routine. The raw processing power you would need to pull off mip-mapped pixels that are anti-aliased (like the N64's) is in the vicinity of ten billion instructions per second. Which is years away from the power that we're talking about for affordable home systems. Even with the Pentium Pro, Intel is only talking around 250 million instructions per second.

The problem is that a general purpose microprocessor is not the right processor to use for graphics. Not when you can build a graphics processor that has more power and is less expensive to make – like the N64's, for example...

'The thing that we found is that people don't necessarily react to more polygons, they react to higher-quality texture mapping... I've seen people draw realistic-looking trees with just four polygons'

Fantasy 500 **is a simulator which uses an SGI Onyx RealityEngine for its horsepower**

The Nintendo 64 hits the UK

Nintendo's shipment of PAL N64s will hit the UK on March 1. Initially only a measly 20,000 machines will make it onto UK highstreets and these will be priced at £250 with games retailing at between £50 and £60. Those wanting to pick up a machine and *Super Mario 64* (which should be just about everyone) won't see much change from £310 – a steep outlay considering that PlayStations currently sell for around £220 including two games.

The lack of machines available to sell at launch must be a frustration to exclusive UK N64 distributor, THE Games. While the system is currently in high demand in the US and Japan, Nintendo faces a difficult task apportioning its production runs to satisfy Europe. In terms of profitability, Europe represents small margins when PAL conversion, a multitude of different languages, and lower economies of scale are taken into consideration. Fortunately, though, as **Edge** went to press, Nintendo announced an increase in the number of machines it will manufacture each month – from 600,000 to 1,000,000.

PAL conversion itself engenders its own problems. With much of Europe being based around the PAL TV system (which runs at 50Hz rather than 60Hz), the UK Nintendo 64 has undergone an internal modulation so that it can be run on any UK TV. To ensure this level of compatibility, Nintendo has equipped the machine with an RF modulator which allows the connection of the console through the standard RF socket that most TVs use for their own aerial reception. The advantage of this is that it's relatively easy to get a picture up and running through a standard TV channel, but the downsides are sadly numerous.

For a start, the internal modulation to 50Hz effectively slows down gameplay by around 17%. While it's possible for developers to compensate for this by tweaking game code so that there is little noticeable difference, those who have played the original NTSC versions are likely to be able to detect a drop in speed. Of equally worrying concern to some people will be the issue of screen borders which has plagued UK consoles in recent years.

This situation arises because of the increased number of horizontal scan lines on the PAL TV system (625 as opposed to the 525 NTSC standard). Because most games are designed for NTSC markets (the US and Japan, chiefly), Europe tends to get short shrift.

Encouragingly, **Edge**'s recent test of the PAL version of *Super Mario 64* (the only PAL title available for evaluation at the time of writing) revealed a fairly healthy state of affairs, with the screen borders noticeably less obvious than those on the Super

UK-based gamers can now go out and buy the most critically acclaimed piece of hardware in existence. But how do the limitations of the PAL system affect the console? And what are the benefits of buying on import?

PAL on test

Anyone that has had the opportunity to compare the difference between a game running on an NTSC console and one on its PAL equivalent will appreciate what compromises the UK gamesplayer has to endure. Letterboxed screens, slower displays and, more often than not, crude TV connections do little to match the full-screen, full-speed excesses of 'as nature intended' NTSC gaming.

However, **Edge**'s recent test of one of the first PAL machines to enter the UK revealed a more promising situation. Screen borders are now roughly half the size of those on the UK SNES – at least on *Super Mario 64* (below) – and hopefully only titles that already have small borders (*PilotWings* and *Wave Race)* will be the ones to suffer unduly. Inevitably, game speed *is* slower than NTSC, though, but only those with experience of imported N64s should be able to draw fault.

The UK N64: what are the differences?

The UK machine is visually identical to the Japanese and US models, although the UK packaging (right) differs somewhat from its Japanese and American counterparts. As with NTSC machines, the power supply (far right) plugs into the back of the machine, although the UK console comes with an RF converter and related cables (centre, right) instead of the usual composite AV cable. UK carts use a territorial protection system similar to the SNES, so expect converters to appear soon...

UK packaging (left) has been changed from the US version. In place of an AV lead is the RF converter, switch and cables

The UK Nintendo 64 power pack also plugs into the N64's rear

N64 specs

CPU
- MIPS 64bit RISC custom R4300 running at 93.75 MHz

Reality coprocessor
- 64bit RISC processor running at 62.5MHz
- Built-in RSP (graphics and sound processor) and RDP (pixel drawing processor)

Memory
- 36 Mbits Rambus-designed 9bit DRAM (4.5 Mb), maximum transfer rate: 4.500 Mbits/sec

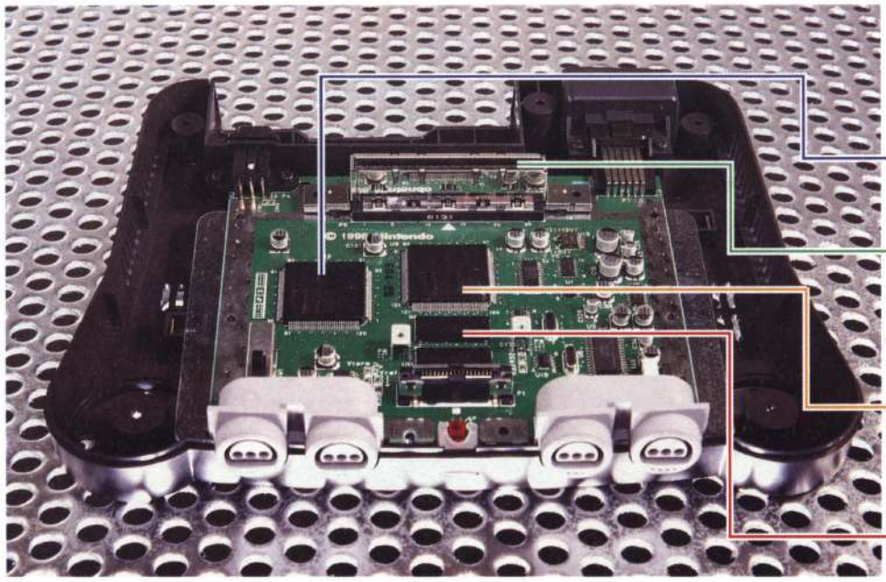
Resolution
- 256x224 or 640x480 with flicker-free interlace support

Colour
- Maximum 16,8 million colours, 32bit RGBA pixel-colour frame buffer support
- Standard 21bit colour output

Audio
- Stereo 16bit PCM
- 64 channels at 44.KHz

Benchmark performance
- Main CPU clocked at 125 MIPS
- Graphics coprocessor clocked at 100 MFLOPS (millions of floating point operations per second)
- 100, 000 polygons/sec with all hardware features turned on

Lifting the lid on the Nintendo 64



The Nintendo 64's architecture is a miracle of console engineering, providing never-before-seen levels of power from a remarkably clutter-free chipset. Edge lifts the bonnet...

64bit MIPS custom R4300 CPU running at 93.75 MHz. Unlike an unaccelerated PC, the ultra fast operation of this chip isn't burdened by a heavy graphics overhead

The cartridge slot of the machine extends onto the underside of the PCB and also acts as an expansion port for the forthcoming 64DD. This is the entry point to the system's internal architecture and can access all chips

The much-vaunted Reality Engine coprocessor is a re-engineered version of the multimedia engine designed for high-end SGI workstations. Running at 62.5 MHz, it is divided into two parts: the Reality Signal processor (which calculates all the geometry) and the Reality Display processor (which draws everything to the screen)

There are 4 megabytes of Rambus-designed DRAM in the Nintendo 64. This a unified memory system which is shared between sound, game logic and graphic data

Nintendo (see 'PAL on test'). However, game speed is perceptibly slower than its NTSC equivalent, although it's arguable that the gamers who will notice the difference are likely to have already opted for imported machines. What it comes down to is personal preference and experience. The fact is that most UK-based Nintendo 64 owners probably won't even know what they're missing.

The matter of connecting the PAL machine to the TV *is* a disappointing one, though. Surprisingly, although just like its NTSC counterparts, the UK PAL Nintendo 64 is incapable of outputting an RGB signal. What was originally seen as a move to prevent huge numbers of grey import machines filtering into the UK (as happened with the Super Famicom six years ago, which could easily be hooked up to a SCART TV), has now regrettably handicapped the potential quality of the UK machine's display. This is particularly galling given that the majority of UK videogamers probably own TVs capable of running RGB through SCART. UK N64 owners will not be committed to running their machines through RF, though – composite leads (which offer little improvement over RF) will soon be made available and S-Video cables should also arrive soon (although **Edge**'s S-Video lead for its Japanese N64 provided a slightly washed-out signal on the PAL machine when tested).

Despite its incumbent shortcomings, for the average gameplayer that isn't striving for perfection, the UK machine will undoubtedly be the one to choose. For hardcore gamers undeterred by buying games from specialist importers, the US and Japanese machine will continue to find itself a market niche.

Surprisingly, just like its NTSC counterparts, the UK PAL Nintendo 64 is incapable of outputting an RGB signal... this has regrettably handicapped the potential quality of the UK's machine's display

The 'Evolving Video Game Machine' examined

In accordance with the inordinate amount of time the Nintendo 64 took from being merely an idea on paper to becoming the most powerful piece of home videogaming kit the world has ever seen, the finished unit includes all manner of features intended to stave off obsolescence for as long as possible...

Unlike any system before it, the N64 offers four joypad ports as standard

Viewed from above, the N64's 64DD memory card slot is clearly visible

The rear of the machine reveals its power-supply and multi-out socket

The N64's underside exposes a connection which will accept the 64DD

Designing the ultimate controller

The standard 'direction pad' design has changed little since the inception of the Game & Watch in the early '80s. Although Sony introduced a new, more comfortable shape with its distinctive PlayStation controller, the product's eight-way D-pad worked in exactly the same way as the Mega Drive, NES and even Atari controllers before it. The world expected more from Nintendo when the N64 project was announced, and, unsurprisingly, it delivered the goods.

The existing design did not arrive immediately, though. As with most important innovations, the N64 joypad went through many incarnations before the final mould-breaking product was achieved. **Genyo Takeda** (left), general manager of Nintendo's R&D3 (the division which designed the console and pad), claims that several prototypes were developed and abandoned as the engineers became more ambitious. The team even toyed with the idea of a motion-sensor wristwatch, but the idea was abandoned because test-group children experienced difficulties using it.

Despite the N64 pad's initially bewildering array of buttons, its design is actually extremely efficient and intuitive. There are three points of control: a standard cross-key pad on the left, a '3D' analogue controller in the centre, and a set of four yellow buttons on the right. Accompanying these are two buttons, and a trigger on the controller's handle.

Of course, the huge advantage of Nintendo's new stick is the analog stick on the centre prong. Conventional joypads have two main flaws. First, they work on a digital on/off basis, so there is no way to move in subtle phases. The N64 analogue stick, however, uses a 127x127 grid to detect degrees of movement so that the player can achieve much more subtle control. Second, normal pads are only capable of eight-directional movement, which severely restricts the amount of control a player has over gameplay. In contrast, the N64's analog pad actually offers a range of 360° movements.

Although Nintendo was by no means the first company to employ an analogue control device – several home computers have boasted similar controllers – it was perhaps the first to realise the huge potential of the system in sophisticated videogames. Inevitably, the brilliance of the pad sparked full-scale interest in analogue systems among the hardware engineers within Sony and Sega, both eventually producing their own versions.

Where Nintendo will go now is unpredictable. The next step is, of course, to do away with a handset altogether (perhaps Takeda will dust off the wristwatch idea for the N128), but for now, the N64 controller is by far the most sophisticated control device available.

The Nintendo 64 joypad's excesses are clear, from the array of buttons situated on its top to the revolutionary port which appears on its underside

Jolting pack

The N64 controller also boasts a port on its underside, directly in front of the 'Z' trigger. The main use for this to accept N64 256K memory cards, which, like the PlayStation versions, can be used to save high scores, positions within games and character hit points, etc.

At last year's Shoshinkai show, Nintendo announced a new peripheral called the Jolting Pack which will also connect via the controller's port. This rather curious novelty device judders in relation to what's happening on-screen to give a scaled-down sensation of those found in modern-day driving coin-ops. It's perhaps one Nintendo innovation that Sega and Sony won't be falling over themselves to replicate...

Mario sells out

The phenomenal success of *Super Mario Kart* in Japan has underlined the popularity of big-name software releases on the Nipponese gaming scene.

Many eager gamers were left disappointed when they visited major game outlets on the game's release date, December 14, only to find that the title had sold out within the first hour of hitting the streets.

The title sold 1.4 million copies in the first two weeks of being on sale and included a joypad within the bundle for ¥9800 (£50). There are hopes that THE Games will offer a similar package when the game reaches UK shores some time in early summer.

What does the future hold for the N64?

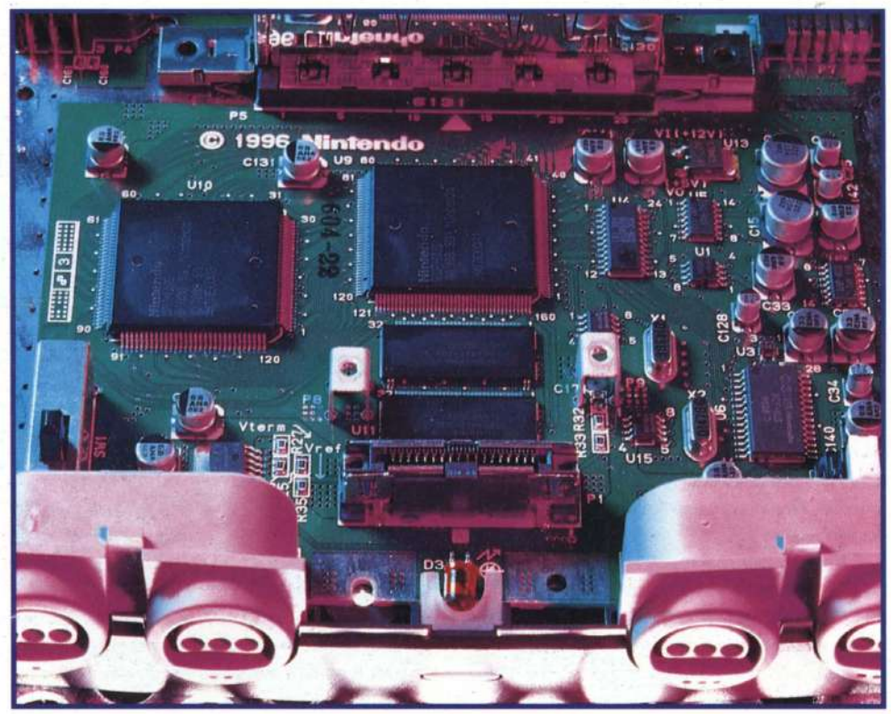
When the world's gaming press attended Shoshinkai in 1995, many entered the show as jaded hacks and came out as starry-eyed otaku. The cause? An early demo of *Super Mario 64*. It was apparent, even at such an early stage, that this was clearly one of the best videogames ever created.

A year and a half on, the N64 is now the most powerful piece of gaming hardware available. *Mario 64* was initially joined by *PilotWings 64* and shortly after by *WaveRace 64*, and *Zelda 64* speaks for itself. Most importantly, Nintendo claims that there is still further potential in the machine. According to **Shigeru Miyamoto**, *Mario 64* used around 60% of the machine's capacity and yet still holds the crown for the most stunning visuals. Plus, 128Mbit cartridges will soon be available thanks to tumbling ROM costs.

It would be naive, however, to suggest that the N64 is impervious to obsolescence. The technology behind the machine is already getting on a bit, the launch date being delayed time and time again by hardware shortages and vital games missing their development deadlines. If the N64 was a PC, it would have been redundant several months ago. And then there's the frighteningly powerful M2, due some time in '97. In terms of hardware specifications, Nintendo's console will obviously find it difficult to compete.

But the future does not always belong to the more powerful contender. This is, after all, Nintendo – the company which has almost defined videogaming for 15 years. M2 does not have an in-house development team of NCL's calibre, neither does it have the experience of Miyamoto. Nintendo may be facing a difficult competition for dominance of the 64bit market next year, but there are ways – apart from an amazing software catalogue, of course – to stay in the game.

One of these is to follow the old 'speculate to accumulate' adage and expand into new areas. Shigeru Miyamoto told **Edge** recently, 'What we are selling is a computer-like toy, and, as with all toys, if you are to fully utilise its functions, it shouldn't be used for just one thing. I believe that the Nintendo 64 hardware was designed to offer a variety of ways for the consumer to enjoy themselves.'



One of these new avenues of enjoyment could be the Internet. Ever since 1995's Shoshinkai show, Nintendo has been talking about releasing a peripheral for the N64 which would allow users to download new characters and levels for N64 games. There is no doubt that the Internet is growing in popularity, and not everyone can afford a decent personal computer to experience the phenomenon.

However, this could be a risky move for Nintendo. Chairman **Hiroshi Yamauchi** has always been highly concerned with control and regulation – in fact, one of the reasons the cartridge format was chosen for the N64 was so that the amount and quality of developers could be controlled. The total freedom of the Information Superhighway goes against everything Nintendo stands for, and reconciling itself to this chaos will be a major test for the company.

There is a surer route forward for the N64, though, a route which will mean larger games and may eventually allow players to customise future software titles. It could even lead to a whole new genre of games. The item in question is, of course, the infamous, long-awaited 64DD peripheral.

Nintendo 64 software: the global picture

N64 games will reach the UK in a style that will be familiar to those with experience of SNES software (above left). US games (above) tend to have slightly less exuberant packaging than Japanese versions (right)

Though these cartridges look very similar on the face of it, UK cartridges (left) will not currently work on any other territory's system due to a lock-out chip (and this also prevents running imported carts on the UK N64). US carts (centre) will work on a Japanese machine once the N64's protective plastic tabs have been removed

64bit videogaming bulks up

Back in May 1994, Nintendo announced that the N64 would be cartridge based and in doing so sent waves of shock and near bewilderment through the videogame industry. Until that point, CD-ROM had been more or less accepted as the future of videogaming, CDs being cheap to produce and capable of holding up to 650Mb of data. To many, it seemed odd that Nintendo should fall back on the outmoded cartridge format.

A year later, though, the company unveiled its plans for the 'Bulky Drive' peripheral – a proprietary storage system based around magneto-optical technology (which boasts faster access times than standard CDs and is writeable). The device, which is scheduled for release at the end of 1997, has a 64Mb capacity and is designed to sit beneath the N64, connecting to it via a port in the console's base.

There are two main advantages to this unique system. Most obviously, it means that games can be released that require both cartridge and disc – a vital necessity for titles like *Legend of Zelda 64* which feature huge, fully explorable worlds that simply would not fit on a cartridge alone. Secondly, each Bulky Drive disc has 26 Megabits of writeable space available, which allows users to store their own data and so paves the way for Nintendo to release customisable games. In **E**41, Shigeru Miyamoto talked about working on a disc version of *Mario Paint*, which is bound to use this facility. Plus, if a modem peripheral is released for the N64 at a later date, the Bulky Drive will allow users to download new characters and stages in order to customise their games.

Despite these benefits, however, the Bulky Drive remains a controversial move – chiefly because dual-format machines have never been successful in the past. Sega's Mega CD and 32X platforms failed miserably, and even Nintendo's own disc-drive add-on for the 8bit Famicom proved unsuccessful. There is a chance Nintendo could end up confusing its customers and diluting the N64 format. The risk would definitely be worth it for a considerable boost in memory, but the 64DD, as the Bulky Drive has since become known, only adds another 64 megabytes – a paltry figure when compared to CD storage of 650Mb. In any case, N64 cartridges themselves will soon be capable of holding 16 megabytes.

The 64DD unit will nestle comfortably beneath the Nintendo 64 unit. Despite its technological power, like all Nintendo hardware it will be easy to use, as exemplified by the lack of complicated controls on its facia

In the end, though, the 64DD does have the one key asset which every new piece of videogame hardware needs: a killer app. If *Legend of Zelda 64* turns out to be as impressive as early screenshots suggest, fans of the NES and SNES titles will find it hard to resist buying Nintendo's new peripheral, let alone those who have been lured into the videogames scene in more recent times.

And then there's Miyamoto's latest project – 'self-growing games' which take advantage of the writeable aspect of 64DD discs. Little is known as yet, but, if the old master is on the verge of creating a brilliant new game genre, users will need to purchase 64DD in order to experience what could represent the next generation of interactive entertainment.

And what self-respecting Nintendo fan would want to miss out on that?

The 64DD, originally unveiled at 1996's Shoshinkai, will be launched with *Zelda 64* (top right). *Creator* (right) is another planned 64DD title

N64 converters

Those who have already taken the plunge and bought a US or Japanese machine will be pleased to hear that a bridge adaptor has been developed by the UK-based add-ons specialist, Fire International.

The unit, which costs £20, negates the need to remove plastic tabs on Japanese machines in order to run US games, and Fire is currently investigating the possibility of a UK version which will let users play games of any nationality.

For more details phone Fire on: 01302 751428.

Super Mario 64

Though *Super Mario 64* was the first game developed for the N64, it uses features not seen in any game since, such as this reflective texturing (top). Mario encounters a giant penguin in the game's first ice-bound level (above)

Mario acquires the ability to fly once he finds the winged hat – an essential component in this level

At a later stage in the game, *Mario 64*'s focal point, the castle, can be explored from an entirely different perspective from the one at the start. Flying around this environment is one of the game's high points

Anyone who has made even the faintest contact with Nintendo products over the last ten years cannot have failed to become aware of its hottest property, an Italian plumber by the name of Mario. In fact, so all-pervasive is the character that he has become synonymous with videogames in general. It is understandable, then, that Nintendo chose to use the moustache-bearing mascot in the first title to showcase its 64bit technology.

Bringing just about every element of the long-established *Mario* universe – from Koopas to mushrooms to the mighty Bowser himself – to the N64, series director **Shigeru Miyamoto** lead his team to create perhaps the most memorable videogame seen since the first groups of pixels crawled around the screen in the likes of *Pong*.

The premise is quite straightforward, as is to be expected from a Nintendo game. Mario is on a mission to rescue his sweetheart, who has been captured by his arch nemesis., Bowser.

An inordinately simplistic state of affairs opens out into what must surely rank as the most complex and unrelentingly inventive 3D environments ever created.

Mario begins his adventure in the surrounds of an exquisite castle, where numerous graphical and sound effects conspire to create a uniquely atmospheric game world. After exploring the environment – and, crucially, the 20 or so actions that Mario has at his disposal, from jumps, punches and kicks to back flips and sliding attacks – the player is drawn into the castle itself, whereupon the adventure proper begins.

The in-game camera can be manoeuvred at any point via the N64 joypad's four yellow buttons. This is essential during levels which continually turn back on themselves

One camera view (left) allows a breathtaking view of the game environment from behind Mario himself

Mario's final confrontation with Bowser sees his enemy drenched in a sinister colour scheme (above left). Among Mario's comprehensive range of actions is the ability to climb poles (top left). This ghostly adversary (top right) will be familiar to those who've experienced the 16bit *Super Mario World*. Magic carpets offer relief from platform-based action (right)

From top: underwater sections are among the game's most atmospheric; hitching a ride on the head of a giant subterranean beast; inside the giant clock interior that becomes available for exploration later in the game; taking to the skies and marvelling at semi-translucent rainbows

Subdivided into 15 individual chunks, the overall quest sees Mario negotiating locations as diverse as pyramids, lava-ridden expanses and subterranean caverns, while also dealing with several off-shoot sections that will only be revealed through the most diligent of playing approaches.

Collecting stars is the key to progress throughout the game – acquiring them opens up new areas – each section including several to be found. Collecting a star forces Mario to exit a level, but often changes its structure, thereby necessitating re-entry in order to access stars that were previously inaccessible. This structure means that what might have amounted to a relatively small playing area is expanded to become a comprehensive world that opens up gradually as progress is made – a hallmark of Nintendo software ranging back to such SNES classics as *Zelda III* and *Super Metroid*.

Though the game's graphics are concertedly cutesy, there can be no denying the quality of animation, use of colour, and textures that make up the game world

Throughout the game, the N64 generates the most impressive graphics ever seen in the home. Though their styling is concertedly cutesy, there can be no denying the quality of animation, use of colour, and textures that make up the game world.

In terms of audio content, Nintendo serves up another aural extravaganza which suffers not a jot from its silicon-based origins. Mario himself squeals and shouts his way through his adventure, while Nintendo old hand Koji Kondo provides a host of jingles that match the graphical content perfectly.

The game's only faults are the occasionally awkward camera work that is prevalent at some points (which can nevertheless be altered to suit the player at will), and the rather-too-revelationary nature of some of the in-game hint points, which can occasionally spoil the sense of discovery somewhat.

Nevertheless, the diversity of locations, graphical style and gameplay content mark *Super Mario 64* out as a revolutionary title. Nintendo had a hell of a task on its hands in bringing Mario kicking and screaming into a full 3D environment, but its endeavours represent a benchmark in videogaming.

Edge rating:

Ten out of ten

PilotWings 64

***PilotWings 64* contains some of the most complex 3D environments seen in an N64 game to date. One rocket belt stage involves a subterranean cave system (above)**

Aficionados of the original SNES game will immediately know what's expected in this 64bit update. *PilotWings 64* is a difficult-to-define flight sim hybrid divided into a series of flying tasks that take place in a variety of different locations. There are initially three vehicles available to the player – gyrocopter, hang glider and rocket belt – each with its own set of different flight missions. The aim is to complete the missions and progress from amateur aviator to professional pilot in each of the craft. Simple.

Except, of course, *PilotWings 64* is anything but simple. It is in fact a brilliant, thoroughly compelling and at times horribly frustrating concoction. In some ways it's three games in one, because the three craft handle so differently and have such contrasting mission objectives. With the highly manoeuvrable rocket belt, for example, players have to fly though series of hoops to get points, whereas in the more realistic and less-responsive gyrocopter they have to shoot at huge targets. With the hang glider it's often simply a case of staying airborne by steering into thermals – a devilishly difficult task at times.

As you would expect from a Miyamoto-designed game, there's a plethora of secrets to discover throughout the game and plenty of improvisations on the standard tasks. It is often the case that, just when you think you have mastered all the tactics you'll need, another gameplay slant comes along and knocks you sideways. Plus, there are myriad classic moments in the game: firing rockets at marauding giants, swooping over sickeningly steep rock faces, careering between skyscrapers – all delivered with the most realistic feeling of flight yet simulated on a console.

The hang glider sections (above left) are quite serene in content when compared to the rocket belt levels, where the player sometimes finds it necessary to manipulate giant bouncing balls, bizarrely (above right)

There are myriad classic moments in the game: firing rockets at marauding giants, swooping over sickeningly steep rock faces, careering between skyscrapers...

And the graphics are truly stunning. Locations range from busy holiday islands to sparse tundra landscapes to vast grassland plains, and all exude masses of fascinating detail. The tasks themselves may be slightly surreal, but the worlds in which they exist are beautifully designed and hugely realistic.

PilotWings 64 is a challenging, addictive game which just happens to boast some of the finest 3D graphics to date on any platform. It may not have the immediate cutesy appeal of *Mario 64*, but it does have plenty to offer in terms of gameplay, scope and inventiveness. *Zelda* or *Star Fox* may later push it further down the list, but for now, *PilotWings* is one of the three best games on the N64.

Edge rating:

Nine out of ten

There are four extra modes of play, including skydiving. This section requires the player to link with other aeronauts (right) before approaching the ground (above)

Shadows of the Empire

As the nagging doubts persist over the quality of secondparty N64 titles, LucasArts' eagerly awaited 'Star Wars' epic will do little to silence the critics.

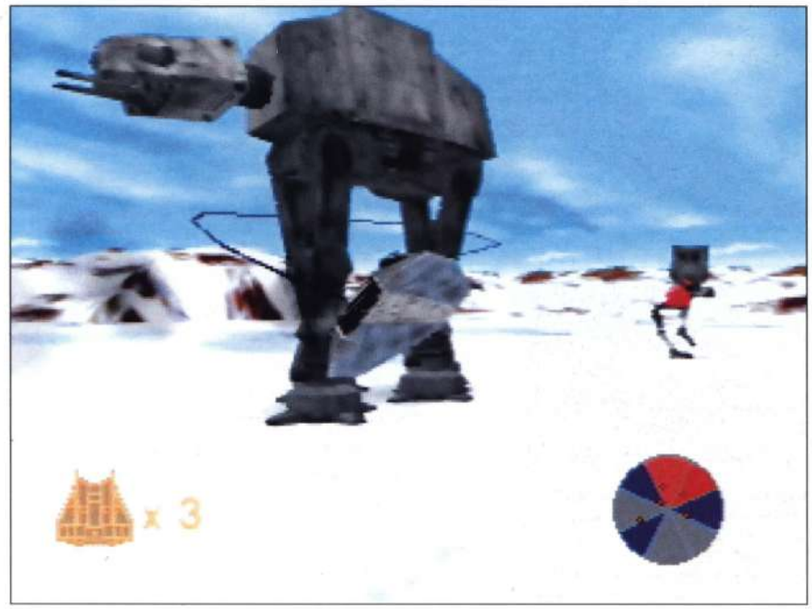
What could – and should – have been a dream ticket for both Nintendo and the premier US developer staggers into the 64bit era with little to recommend it but a great license, a few moments which capture the unique flavour of the movie trilogy and, very occasionally, a tantalising glimpse of what might have been had the game been overseen more closely.

A conspicuous lack of secret areas and no puzzle-style elements suggest that LucasArts has learned little since the disappointing PC title, *Dark Forces*

Shadows of the Empire is made up of ten relatively short levels, split between first-person shooting, on-rails acrobatics and diverting pilot sections reminiscent of Shigeru Miyamoto's classic *Star Fox*. The first level is one of the best, drawing the player into a familiar world of Snowspeeders, AT-AT Walkers and Imperial drones. Those who erroneously bought the PC title *Rebel Assault* will no doubt be impressed, as the spooled FMV tedium of that game has been replaced with smooth, realtime 3D, detailed textures and some truly exciting gameplay that includes roping the hulking AT-ATs and watching them crash into the snow as chaotic laser fire fills the air. Unfortunately, Lucas plays its trump card too soon, and the levels that follow struggle to maintain the momentum.

The first-person *Doom*-style levels should take most of the blame. Bland, incredibly short corridor sections, with almost no variety of opponents, a conspicuous lack of secret areas and no puzzle-style elements suggest that Lucas has learned little since the disappointing *Dark Forces*. The game's hero, Dash Rendar, looks anything but heroic, and as the player is funnelled along the icy tunnels of the Hoth base, the nagging doubts begin to surface.

These are only furthered by the tedious Ord Mantell junkyard level, which forces Rendar to negotiate a moving train through an arduous journey. This section is quite literally 'on rails' and drags on for an incredibly long period, seeing the player making several trial-and-error decisions. When it does eventually reach its climax it collapses in a lacklustre struggle with a bit-part droid.



The first level, which sees Rendar piloting a Snowspeeder over the frozen wastes of Hoth, proves to be among the most enjoyable. Split into several sections, the final one presents AT-AT adversaries

A speeder-bike chase through Mos Eisley (presented with some of the fastest-moving visuals ever seen in a videogame) and some engaging space combat sections save the game from being a complete disappointment, and point to the kind of white-knuckle ride that *Shadows* could so easily have been if its developer hadn't been so determined to mix so many established game styles, each of which having been superlatively represented on other platforms, which shows just how unfortunately broad the LucasArts brush-strokes have proved on this potentially groundbreaking occasion.

Edge rating:

Six out of ten

An in-cockpit view provides a seat-of-the-pants feel during the Millenium Falcon section, which provides classic 'Star Wars' action

The *Doom*-style sections see Dash Rendar face off against Imperial Storm Troopers (above). The speeder-bike level (above right) is one of the game's most exciting. Rendar comes up against a daunting Imperial Walker (right)

WaveRace 64

The sheer scale of some of the waves on the fourth course (top) is impressive. This neon-bedecked course (above) is visually strong

Some titles could only be made by Nintendo and *Wave Race 64* is one of the best examples. What it may lack in jawdropping visual ostentation (and it isn't much) it more than makes up for with its pioneering use of realtime 3D and its unswerving commitment to shaping a new gameplay experience. And this essentially comes down to one thing: the best water effect ever seen in a videogame.

Creating realistic water has always been an unsurmountable challenge for game designers, and even Namco and Sega, equipped with their state-of-the-art 3D coin-op technology, struggle to come close to delivering the kind of dynamics and realism that Nintendo's programmers have. *WaveRace* expends around 600 polygons per frame solely on creating an undulating and rolling seascape that never fails to impress. With every twist and turn of the jetski the water effortlessly rolls and swirls underneath to give an unprecedented feeling of realism. It also makes for one of the most enjoyable gaming experiences to date.

Based loosely around the same game structure as previous Nintendo racers such as *Wild Trax* and *F-Zero*, *WaveRace* pits the player in a series of championships. The first course is a simple loop affair but is a good example of the kind of environments to expect, with an attractive island and gloriously effective waves. Later courses feature more spectacular detail, with hovering helicopters, leaping dolphins and, best of all, a beautifully serene lake course with mist that gradually clears to reveal stunning waterside reflections.

One of the best-looking courses is Lakeside (top left), replete with stunning reflections. Lens flare makes a visually striking contribution to the sunset course (left), while the helicopter (right) impresses with its detail

As with other Nintendo games, controlling the variety of jetskis doesn't come as easily as you might expect, but a comfortable learning curve gives the game its intrinsic appeal. The analogue stick works perfectly, enriching the game system with subtlety and rewarding on-screen feedback, and the different skis all feature unique handling characteristics, some tight on cornering, others better at flat-out wave skimming.

If any criticism could be levelled at all at *WaveRace*, it's that the 12 or so circuits can be seen rather too quickly. Three progressive difficulty settings gradually open up the full suite of courses and, although it does get tough towards the end, the lifespan of the title – in oneplayer mode at least – is slightly curtailed. To make up for this the split-screen twoplayer game is an excellent inclusion, not suffering from the performance handicap that usually renders such modes redundant. Further additions include a time trial section and, even better, a variety of stunt tracks that encourage the player to pull off a range of extravagant moves.

As with *PilotWings* and *Mario 64*, *WaveRace* represents Nintendo doing what it does best – delivering a gameplay experience refreshingly different from anything that has gone before.

Release: April

Players have to steer either side of floating buoys (above) – missing one incurs a power loss. The killer whale (above) is just one of a horde of hidden secrets – classic Miyamoto

***WaveRace* expends around 600 polygons per frame solely on creating an undulating and rolling seascape that never fails to impress. The water swirls to give unprecedented realism**

Edge rating:

Nine out of ten

Turok: Dinosaur Hunter

Set in a hybrid prehistoric world, where the dinosuars are bionic and the natives carry lasers, this first-person shoot-em up, like *Mario 64*, gives the player a uniquely 64bit experience. Iguana has used every trick in the N64 book to bring the jungles and temples of *Turok* alive. The pools of water that litter the landscape are transparent, and the player can see through to the prehistoric fish that swim just beneath the surface. Looking up blinds *Turok* with bright sunlight, a perfect simulation of lens flare, and many of the rock faces can be climbed.

Though effects such as these appear cosmetic, they greatly enhance the immersive quality of the game, and leave the evidently rushed *Shadows of the Empire* struggling to keep up. The level designs are praiseworthy, too. The player rarely feels constrained, roaming freely about the landscape at will, discovering hidden areas and ambushing the cannon-fodder goons that routinely attack with little more than a sharp stick. Where Iguana has been especially clever is in carefully easing the player through the levels, not with obvious signposts, but with imaginative and thoughtful design. Caves appear on ledges, hidden worlds lie waiting at the bottom of deep lagoons, and many of the buildings have secret passageways and bonus levels that turn what could so easily have been tedious wandering into exploration and adventure.

The eight levels may seem meagre compared to *Tomb Raider*'s 15, but each provides enough variety to keep things interesting. Some are jungle-based, with scattered settlements, others labyrinthine temples and dungeons, and as the game reaches its denouement, the setting moves to a weird futuristic city, the home of Turok's arch nemesis, The Campaigner. The only possible gripe that *Mario 64* fans may have is over the mysterious mist that obscures much of the view – apart from the next approaching monster. This is forgivable only because the next monster is likely to look so startlingly real that anyone used to the blocky textures and crude geometry seen on 32bit consoles will be too busy marvelling at the smooth animation and detail to grumble about the view. Though the game begins with simple raptors, as Turok progresses the dinosaurs become ever more sizeable and complex, culminating in a gigantic end-of-level T-Rex and a brachiosaur so huge that only its head is visible above the mists, the rest of its body all but lost in the deep valley below.

After the hugely disappointing arrival of games like *Cruis'n USA* , *Turok: Dinosaur Hunter* shows that some members of the 'Dream Team' are capable of creating rich 64bit software.

Edge rating:

Nine out of ten

The T-Rex end-of-level boss is incredibly detailed, and is one of the largest 3D models ever seen in a videogame

The lighting effects are especially impressive. There's lens flare from the sun whenever Turok looks to the sky (above left) and giant transparent explosions (above centre). The Campaigner (main)

The player rarely feels constrained, roaming freely about the landscape at will, discovering hidden areas and ambushing the cannon-fodder goons that attack with little more than a sharp stick

The original version of *Turok* includes plenty of bloodletting (left), but the version that makes it to the shelves will feature toned-down content. Dinosaurs are odd, bionic creations (above centre). The N64's translucent lighting abilities are particularly effective when used in conjunction with weapons (above right)

The trees that feature in the jungle sections are full 3D models, not, as is most common, flat bitmaps

Release: March 10

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Legend of Zelda 64

If *Super Mario 64* was the most eagerly awaited of the N64 software line-up, then *Legend of Zelda 64* must have been a very close second.

Due to appear at the same time as the 64DD mass-storage peripheral – currently understood to be hitting the Japanese market late this year – the game is the fifth *Zelda* title, following two outings on the NES, one on the SNES and one on the Game Boy.

RPGs are still the most popular game genre in Japan by some margin – indeed, Square Soft's PlayStation title, *Final Fantasy VII*, has recently broken records in terms of number of pre-ordered copies – and *Zelda 64*, like its predecessors, takes the established themes of the game style (exploration, battles, magic, gathering special items and weapons, etc) and presents them with an action twist.

Link, the central character of *Zelda 64* whose endeavours, like Mario's, always seem to see him rushing to the aide of a damsel in distress, returns once more to the land of Hyrule where he clashes with foes of old, including skeletons and, indeed, his arch enemy, the evil sorceror Banon.

A time element means that the game world changes as day passes over to night. Though the buildings in the world of Hyrule look like simplistic models, their contents should make for a comprehensive adventure

All of the familiar *Zelda* elements will be present in this sequel, and, as in *Mario 64*, their 3D representations will be viewable from a multitude of angles – combat appears to lend itself to a higher view while moving around towns sees the camera at a closer-to-the-ground vantage point.

In gameplay terms, Link will have access to the range of actions that gave him such flexibility in titles such as *Zelda III* – running, swimming, dashing attacks, spin swipes, etc – but will also be able to perform what Nintendo terms a 'vertical' attack and, crucially, jump. The latter option hints at a *Mario 64*-esque game world which will further enhance the adventure elements of the game.

Though Nintendo has yet to clarify many specific details about *Zelda 64*, it is known that one of the series' most endearing aspects – the sheer range of items that Link is able to find and use – will be present and correct on the N64. The prospect of using a

The varying camera work conspires to provide an effective view of Link as he charges into the screen (above). Unlike the N64's other big RPG, *Mother 3*, *Zelda 64* goes the whole hog with textures to give old enemies such as skeletons (right) an all-new 64bit sheen. The results are impressive

The N64's analogue stick will make combat an interesting proposition. Here, Link faces up to another wildly enhanced enemy from earlier in the series, now presented with armour rendered with metallic-style textures

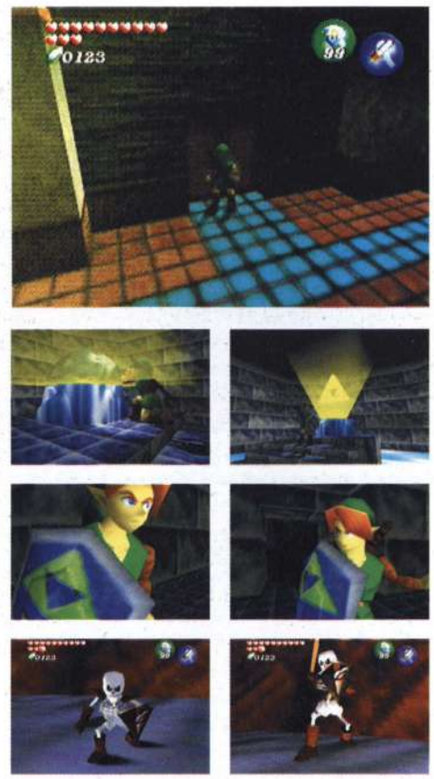
boomerang or a grappling hook in a full 3D environment will certainly whet the appetites of the millions who've followed Link's pursuits in recent years.

Nintendo has so far only shown *Zelda 64* in a rolling video format and in static shots, but the evidence so far hints at a 3D engine not too far removed from that of *Mario 64*. This means, of course, that while its environments are certainly expansive, they're not going to be packed to bursting with detail – at least not in the exterior sections. In order to bring a level of realism and atmosphere to the proceedings, then, the game uses a realtime day-and-night system and weather that runs the spectrum from bright sunshine to full-on downpour.

More than simply another N64 game, *Zelda 64* represents a make-or-break step for Nintendo's brave new 64DD storage technology. It's not currently known how the unit's writeable capacity will be implemented throughout the game, but at the very least, its loading speed – which is far quicker than 32bit CD units – should negate the painful problems experienced with some PlayStation RPGs.

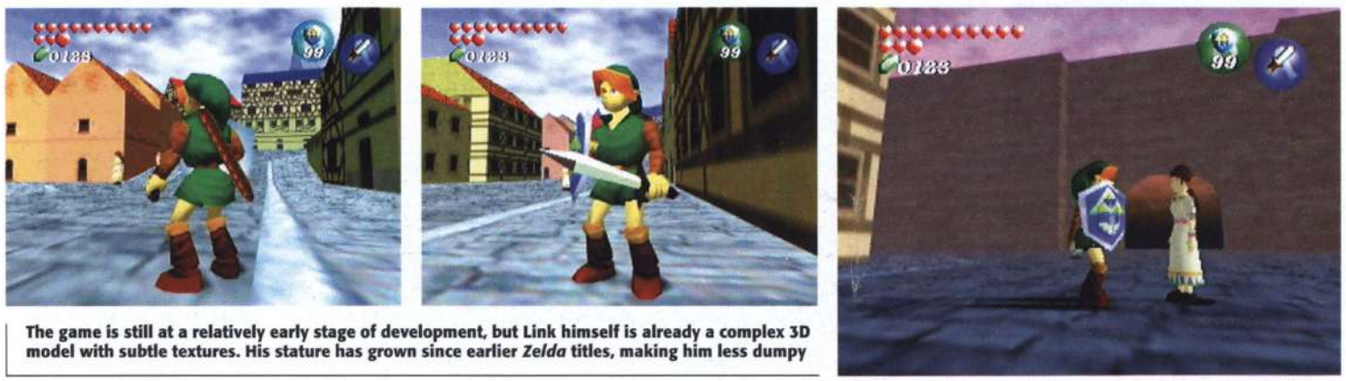
If *Zelda 64* vindicates Nintendo's stubborn anti-CD stance, it will surely pave the way for a whole new level of 64bit software to drool over.

In order to bring a level of realism and atmosphere to the proceedings, the game uses a realtime day-and-night system and weather that varies from bright sunshine to full-on downpour



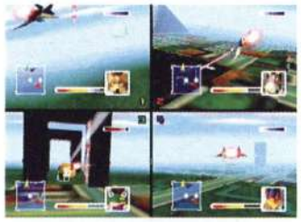
The Tri-force element re-appears, on Link's shield (above centre) and in its own right (top right)

Combat, always an important part of *Zelda* games, will be taken to its 3D conclusion in this 64bit version (above). Link now has the ability to jump (top), which should expand gameplay considerably



The game is still at a relatively early stage of development, but Link himself is already a complex 3D model with subtle textures. His stature has grown since earlier *Zelda* titles, making him less dumpy

Star Fox 64



The simultaneous fourplayer battle mode sees opponents going head to head in an all-out mission of destruction. A welcome touch

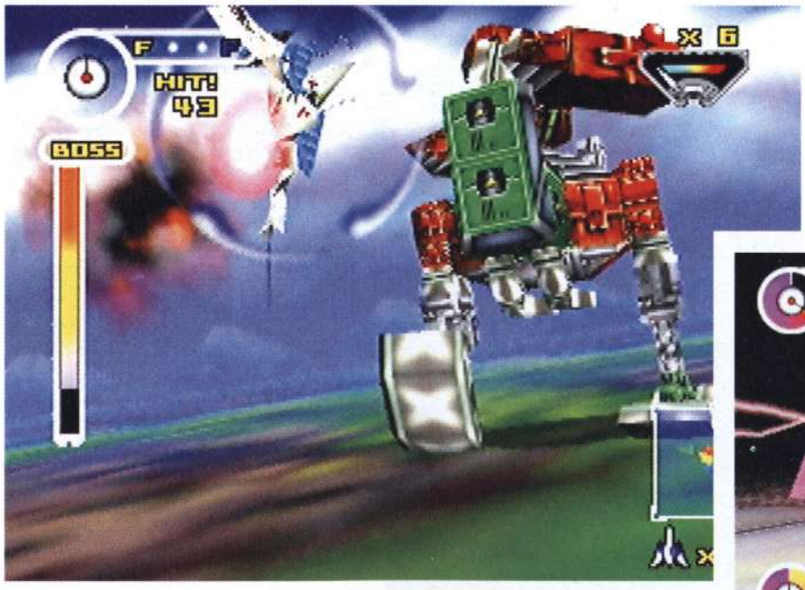
A 64bit revamp is on the cards for the superlative 1993 SNES shoot 'em up, *Star Fox*. Originally developed in conjunction with crestfallen UK development house Argonaut, the 16bit SNES game was the first title to usher in the Super FX chip range of carts which performed miracles in reviving Nintendo's fortunes in the 16bit console wars against arch rival Sega. Entitled *StarWing* in Europe, the game was bundled during the system's twilight year, 1994, where, for the first time in the UK, the SNES outsold the Mega Drive. *StarWing* then leapt back into the Gallup charts, where it remained for several months. The enhanced sequel will be seen as yet another welcome link to Nintendo's glorious past and a back-catalogue ripe with classics.

The plot once more concerns the emperor Andross, the villain from the original game, who has launched another assault on Fox McCloud's home planet, Cornelius. As before, the story is told with realtime cut-scenes that seamlessly flow into the game proper. The cinematic quality is further enhanced by the dramatic camera angles and 'Star Wars'-style panning shots that linger over hulking space stations. The in-game sequences will be equally impressive, featuring detailed textures, reflection routines (whenever the ship flies over water) and a wide variety of environments to do battle over, including mountains, deserts and of course, the interiors and exteriors of the giant spacecraft. It's not all just revamped aerial combat, however. Under the experienced eye of **Shigeru Miyamoto**, the designers have included a new vehicle, a tank, to vary the pace.

Different weapons will become available depending on the selected mission. The default mode will be a regular beam weapon, but by collecting certain items it will be possible to power-up to a double beam mode

Though still 'on rails' (the action essentially moves forward in one direction), the tank can move left, right, backwards and even perform a 'flip' to avoid enemy fire, which should make for some daring manoeuvres when playing the proposed split-screen fourplayer battle mode. Even with all four players skimming around the landscape, the pace and detail remains impressively high. The player's ship (the Arwing) has also been enhanced, allowing for a greater variety of aerial acrobatics, such as loop-the-loops as well as the familair barrel-rolls of old.

Star Fox 64 will also be the first title to take advantage of Nintendo's innovative force-feedback device, the Jolting Pack. Whenever the player takes a hit, the pack vibrates, a strange but effective way to increase the immersive qualities of the game.



The player's ship, the Arwing, remains very similar to the one seen in the original SNES title. It uses a very similar weaponry system and can be made to roll in the same fashion

Large-scale destruction is an important part of *Star Fox 64* (left) – the N64's hardware given a field day

As was the case in the ground-breaking SNES game, Fox McCloud keeps contact with his team of compatriots throughout each mission (below)

The tank-based sections, though less visually striking, provide no less thrills than the space-based missions

Certainly, the game's environment lends itself excellently to something that is free to go off and explore every graphical trick that the Nintendo 64 can possibly call upon

What many fans of the 16bit original will recall was the epic feel of the whole experience. The music, composed in-house, had an orchestral quality that left the Mega Drive in its tracks, and the excellently designed characters, whose friendly rivalry often spilled over into battle, helped to create a superbly engrossing experience. Recreating that should present no significant problem for Nintendo, which has already proved with *Super Mario 64*, *PilotWings 64* and *Mario Kart 64* that its back catalogue of classics is eminently capable of making the jump from the 16 to 64bit.

The biggest problem *Star Fox 64* faces is in creating a game world glorious enough to convert those who still see the N64 as a machine with convincing texture-mapping effects but little else. Certainly, the game's environment – which places no restrictions on its designers to attempt to represent real-world locations or physics – lends itself excellently to something that is free to go off and explore every graphical trick that the N64 can possibly call upon.

The Japanese launch was originally scheduled for the end of March, but has since been delayed until April, during which time Miyamoto-san and his team of graphic artists and programmers put the finishing touches to what must rank as one of the N64's most eagerly awaited releases.

Typically of a Nintendo 64 game, *Star Fox 64* doesn't overload the screen with detail, preferring instead to generate simplistic environments, albeit with subtle use of colour and pacing (left)

Yoshi's Island 64

After his leap from bit-part player to fully fledged star on the SNES, Yoshi will make his 64bit debut not in the 3D environs already explored by Mario, but in a style that will be familiar to fans of *Yoshi's Island*. It may seem an odd decision to some, who assume (correctly) that if the N64 is about anything, it's about stunning 3D, but if designer **Shigeru Miyamoto** has proved anything since breaking onto the videogame scene with *Donkey Kong* in 1983, it's that technology is there to enhance a game, not to define it.

The decision was taken to leave the broad 3D worlds to Mario, using Yoshi to push the traditional platform game to its limits

'When we started software development for the Nintendo 64, we wanted to make a "two-and-a-half dimension" game,' the acclaimed designer reveals. 'We thought this would be easier for the consumers to start playing with. Eventually we decided that this game would be *Yoshi's Island 64*. 3D graphics are fine, but for *Yoshi's Island* we really wanted to have more artistic graphics, so the game is more like a moving picture, or something like that.'

The gameplay emphasis remains firmly egg-fixated – Yoshi carries a trail of the projectiles behind him as he traverses the game world

The decision was taken to leave the broad 3D worlds to Mario, and use Yoshi to push the traditionally styled platform game theme to its limits, using what Miyamoto-san describes as 'cardboard' art, an extension of the distinctive chalk and pencil styles used in the seminal SNES version.

Nintendo's video footage from the Shoshinkai show last November showed the game running at 60fps, with rotating backgrounds, transparencies, wonderful use of colour and delightful animation.

There's little doubt that 2D-style platform games can still cut it when handled properly, just as the original *Yoshi's Island* ably proved. But just how many more tricks Nintendo has up its sleeves to deliver in what is undoubtedly a restrictive environment remains to be seen...

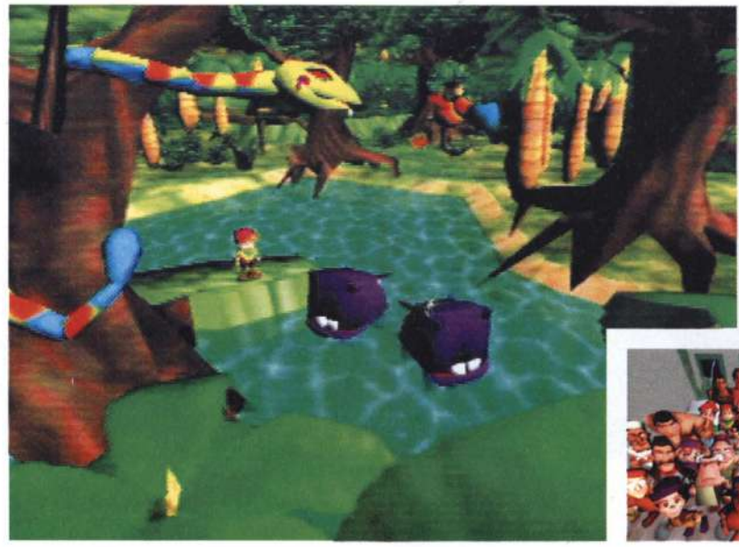
Despite being presented without the aid of polygons for the most part, *Yoshi's Island 64* manages to retain a wonderfully solid look (top). This being a Nintendo game, the designers haven't been able to resist bringing back all of the old, familiar faces (above)

The N64 allows for many more sprites on-screen simultaneously than was possible on the SNES (even with the assistance of a Super FX2 coprocessor). Expect positively hordes of them

Mother 3

Nintendo's gravitation towards sequels and remakes for its early N64 software catalogue is perhaps understandable. What better way could there be of attracting gamers to a new machine than providing them with continuations of familiar and much-respected titles? The original *Mother*, an RPG on the 8bit Famicom, may not be quite as well known as the likes of *Mario* and *Zelda*, but the game attracted had a strong, faithful following in Japan, while its SNES sequel managed to repeat the success even in the US (renamed *Earthbound*). Hence, a new and thoroughly updated addition to this maternally monickered series.

Like *Zelda 64*, *Mother 3* promises to build significantly on its predecessors while not losing sight of what made them popular in the first place. A jump from 2D to 3D was inevitable and, together with the N64's plethora of visual faculties, it has resulted in a much more believable and visually compelling landscape, with gloriously rich and colourful environments replacing the intentionally crude graphics of the former games, which look like a Charles Schultz Peanuts comic strip by comparison.



***Mother 3*'s exuberant graphical style is at odds with the games it succeeds. Note the attention to detail in this shopping scene (above). The game will feature a wealth of characters (left), whose personalities will be enhanced by some clever dialogue**

When the player makes any changes to the surroundings – destroying buildings, moving objects, etc – the alterations are written to the 64DD peripheral

Visuals aside, Nintendo is keeping details of the storyline a closely guarded secret at the moment, and will, as is traditional with releases of this scale, only be releasing details on a gradual drip-feed basis. The gameplay style is set to be similar to its precursors, though, with the player searching fantastical landscapes and fighting all manner of bizarre foes.

Typically for a Japanese RPG, the game is packed with strange characters. The player has three key figures at his disposal throughout the game, which, if **Edge**'s Japanese translation work is up to scratch, are the following: Duster, a sleepy night worker, Mystery Merchandiser, an eerie salesman with an acrobatic monkey, and Luca, a forest adventurer. Apparently the game will also feature characters based on real-life Japanese personalities.

Interestingly, *Mother 3* uses the writeable aspect of the N64's 64DD peripheral (see page 11) to ensure an environmental continuity between gaming sessions. When the player makes any changes to the surroundings – destroying buildings, moving objects, etc – the alterations are written to disk, so that, when play begins again, the world remains as it was left. This type of feature may well turn out to be the most common use of 64DD's 26Mbits of writeable space – especially in RPGs where the intention is to cast players into living, breathing worlds.

Current anticipation for *Mother 3* may well be overshadowed by the promise of *Zelda 64*, but the unique attributes of the series – not least of which its utterly charming brand of humour – will no doubt place this amongst the most eagerly awaited titles of late '97. It will, at the very least, be one of the few games to feature a monkey with notable acrobatic skills.

Japanese developer APE, which is developing the game for Nintendo, has created excellent design work

Diversity of locations is an essential element of RPGs, and *Mother 3* looks set to offer a wide array of quite different situations for the player to encounter

NINTENDO 64

Key N64 titles coming soon

Human Grand Prix

Human

Human is updating a former SNES game for the 64bit market. Though the original title was far from inspired, the success of games such as *Formula 1* on the PlayStation suggests that a healthy market exists for games of this style. Super-fast visuals will no doubt enhance *Human Grand Prix*'s appeal.

Buggy Boogie

Angel Studios

Buggy Boogie gives the player the opportunity to design and drive their own vehicles and engage in car-on-car combat in huge, industrial arenas. The idea may sound cribbed (*Destruction Derby*, *Twisted Metal* and the dreary *Quarantine* have all been here before), but the N64's power will undoubtedly make all the difference.

Freak Boy

Virgin Interactive Entertainment

Virgin's internal development team, Burst, is seeking to create something completely original with *Freak Boy*. The title character must navigate a number of surreally depicted, challenging levels, littered with enemies, obstacles and puzzles. Uniquely, any weapons or power-ups can be added to his adaptive body shell.

War Gods

Williams

Though hardly an arcade classic of the same calibre as *Virtua Fighter* or *Tekken*, *War Gods* should nevertheless provide the N64 with a competent 3D beat 'em up. Competition in the 64bit field is currently weak, but a planned conversion of Atari's *Mace: The Dark Age* should give *War Gods* a run for its money

Mission Impossible

Ocean

Ocean has never been one to shy away from lucrative movie tie-ins, but the days of weedy platform games are looking distant as it puts the full 3D power of the N64 behind recreating the excitement of the hit Tom Cruise movie. Expect some *Virtua Fighter*-style interludes and a wealth of explosions.

Blast Corps

Rare

One of the most promising titles from Nintendo partner Rare, *Blast Corps* sees players clearing a path through levels to allow an out-of-control missile carrier to progress unimpeded, using up to 18 different vehicles, from bulldozers to an 'Akira'-style motorcycle. One of the first Jolting Pack-compatible games.

Body Harvest

DMA Design

Part third-person shoot 'em up, part driving game and part strategy fest, *Body Harvest* casts the player as a futuristic freedom fighter battling against alien hordes that range from giant, mechanical wasps to huge crab-like creatures. In common with *Blast Corps*, the player can drive all manner of vehicles.

GoldenEye 007

Rare

Another movie license, this time from *Donkey Kong Country* creator Rare, promises more than just impressive graphics. The game will make use of the machine's dual analogue/digital controller and should bring the intuitive blasting of the likes of *Quake* a step closer for console owners. Early signs suggest that this will be a huge N64 hit.

Ganbare Goemon 5

Konami

Set in mediaeval Japan, *Goemon 5* will be packed with sub-games and bonus stages. Though ostensibly a Japanese RPG, the game perhaps most closely resembles *Mario 64* in the clean lines and colourful design of its true 3D world, and allows the player to control a number of different characters.

Multi Championship

Imagineer

Unlike its 32bit contemporaries, the N64 lacks an accomplished driving game. With cars based on European touring cars, Imagineer's *Multi Championship Racing* could well fill that yawning gap in the market when it gets a Japanese release in the Summer. The evidence so far certainly shows a more promising title than *Cruis'n USA*...

Dual Heroes

Hudson Soft

Three-dimensional beat 'em up *Dual Heroes* features some well-designed fighters (that unashamedly draw on Bandai's Power Rangers series) although an early version seen at 1996's Shoshinkai was disappointing. A departure for Hudson, most famous for its excellent *Bomberman* series, the game has a lot to prove.

Creator

Software Creations

Game genius Shigeru Miyamoto has reputedly taken this title under his creative wing, such is his enthusiasm for the concept. Players manipulate a 3D world in realtime, building structures, populating it with creatures and watching it 'grow'. It may be a game, it may not be, but what it certainly won't be is unoriginal.

NINTENDO 64

Hexen 64

Software Creations

Following *Doom*, *Hexen* was a big hit on the PC, and has since reached the PlayStation. The N64 version takes a similar route to *Doom 64*, using sprites instead of polygons for the enemies, saving much of the machine's power for the intricate medieval environments. A fourplayer mode looks to be the game's strength.

Soccer 64

Hudson Soft

The N64 has already seen a fantastic football title in the form of Konami's *J-League Perfect Striker*, so Hudson Soft has its work cut out with its effort, currently going under the working title of *'Soccer 64'*. The Japanese softco has little experience in the sports game field, and will be hoping to produce a better game than its poor SNES effort.

Doom 64

Williams

Though not quite the graphical tour de force that many had hoped it would be, *Doom 64* should still find plenty of fans as it makes the leap to the Nintendo 64. Coloured lighting, complex interactive environments and hordes of sprite-based monsters should ensure that the N64 version appeases fans of the seminal title.

Kirby's Air Ride

HAL Laboratory

Kirby, though never quite possessing the same appeal as Mario or Donkey Kong, is another NES, SNES and Game Boy veteran taking his chances in 3D. *Air Ride* is a racing game that regenerates the track every time it's played, which should give it an original appeal, despite its somewhat basic, if nonetheless colourful, graphical nature.

Rev Limit

Seta

Hailed as *Ridge Racer* for the N64, *Rev Limit* puts as much emphasis on driving mechanics as it does racing, with each car possessing its own unique handling characteristics and any scrapes with other vehicles causing real damage. The impending conversion of Atari's *San Francisco Rush* will provide plenty of competition.

Wild Choppers

Seta

Sharing the N64 'copter genre with Kemco's *Blade and Barrel*, *Wild Choppers* also shares gameplay elements – both titles require players to rescue hostages, shoot installations and even blow away little soldiers. It's as far from *Mario 64* as could be imagined, which will please the more serious sector of the N64's potential market.

Robotech

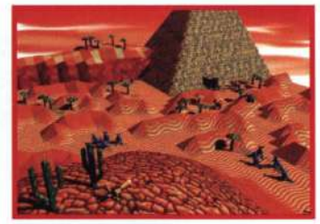
Gametek

Based on a popular American cartoon series, *Robotech* (subtitled *'Crystal Dreams'*) looks at this early stage to be a *Star Fox*-style space shoot 'em up, but with incredibly detailed graphics. Gametek, a member of the so-called 'Dream Team', is hoping this will be the first of many 'Robotech'-inspired titles.

Silicon Valley

DMA Design

DMA is attempting the difficult task of combining platform, beat 'em up and strategy gameplay styles in creating this sugar-coated title. The player must progress through a space station overrun by weird cyber-animals with bizarre muations (rabbits with helicopter-style ears, for example). One of the most original thirdparty N64 titles.



FIFA 64

Electronic Arts

EA will no doubt have a certain hit on their hands with *FIFA 64*, if only for the invaluable licence, which seems to guarantee sales no matter how poor the actual gameplay turns out to be. Fans will be hoping that the N64's unmatched graphics and control system will breathe new life into this terminally repetitive brand.

Top Gear Rally

Boss Game Studios

If *Rev Limit* is the N64's answer to Namco's *Ridge Racer*, then *Top Gear Rally* is its *Sega Rally*. To avoid the bugbear of pop-up, Kemco is making judicious use of the N64's fogging techniques. There are presently only two vehicles to choose from, but more are set to follow in what looks like a very promising driving game.

Blade and Barrel

Software Creations

Along with the enigmatic *Creator*, Software Creations is working on a far more down-to-earth shoot 'em up for Kemco. The player can choose to pilot tanks or choppers in a bid to destroy not only CPU-controlled opponents, but – thanks to the N64's joypad support – three human players in a four-way split-screen battle mode.

Go Go Troublemakers

Enix

Treasure, which consists in part of ex-members of Konami's Japanese console development division, is creating a fast-action, platform-based game which looks reminscent of its Mega Drive classic, *Gunstar Heroes*. Though the game is a concertedly 2D affair, the N64's hardware provides some startling special effects.

Testcreen round-up

Mario Kart 64

Nintendo

Though it's a quality title, *Mario Kart 64* falls short of fulfilling the expectations raised by the seminal 16bit original. Some weak tracks and annoyingly cheap CPU-opponent AI conspire to make the game something of a missed opportunity. Having said that, the multiplayer game is hugely addictive – especially with four taking part – which gives it considerable appeal.

Edge rating: **Eight out of ten**

Killer Instinct Gold

Nintendo

Killer Instinct was first mooted on the N64 when the machine was still in its primary stages of development. That was almost two years ago, when the game was still pulling in the punters as a coin-op. The genre has moved on since then, though, and it now looks extremely dated. Backdrops are impressive, character animation less so, while the gameplay simply lacks sophistication.

Edge rating: **Six out of ten**

Cruis'n USA

Midway

It may have been one of the most successful coin-ops of recent years in the US, but this shallow and poorly realised racing game does nothing at all for the N64. A poor frame rate, abysmal pop-up and weak roadside detail make this a title that both Nintendo and developers Midway would probably rather forget. Perhaps the proposed sequel, *Cruis'n the World*, will fare better.

Edge rating: **Four out of ten**

Wayne Gretsky Hockey

Midway

The future of sports titles on N64 is looking rosy. *Gretsky*, with its fluid 3D, detailed effects (ice spraying off sticks, the puck leaving a trail) and addictive arcade-style gameplay, provides a great showcase for the power of the console. The analogue controller shines once again as the players move in graceful arcs around the rink while the fourplayer mode proves a terrific option.

Edge rating: **Seven out of ten**

J-League Perfect Striker

Konami

EA's *FIFA 64* has a lot to live up to considering the quality of Konami's latest – and greatest – soccer sim. Amazingly fluid motion-captured animation and rock-solid gameplay that allows analogue control of shimmying, feinting and flowing attack moves make *J-League* the best soccer game available on any format. Competition in the genre will be strong, but this looks unassailable.

Edge rating: **Nine out of ten**

1997 N64 releases

Body Count	Kemco
Bomberman 64	Hudson Soft
Cavalry Battle 3000	JSS
Centipede X	GT Interactive
Chameleon Twist	Japan System Supply
Clay Fighter 3	Interplay
Climber	Nintendo
Command and Conquer	Virgin
Cruis'n USA	Williams
Cu-On-Pa	T&E
Dark Rift	Vic Tokai
Dead Ahead	Optical
Doraemon	Epoch
Duke Nukem 3D	GT Interactive
Erutel	Imagineer
Final Round 64	Konami
Fire Emblem 64	Nintendo
Frank Thomas Baseball	Acclaim
Golf	Nintendo
Human Wrestling	Human
Ikazuchi no goto ku	Seta
J-League Dynamite Soccer	Imagineer
International Superstar Soccer 64	Konami
Joust	GT Interactive
Jungle Emperor Leo	Nintendo
Jurassic Park 2: The Lost World	Dreamworks
Ken Griffey Junior Baseball	Nintendo
Killer Instinct Gold	Nintendo
Kindaichi Shonen no Jikenbo	Hudson
Lamborghini 64	Titus
Like Thunder Go!	Seta
Loderunner 64	Bandai
Mace: The Dark Age	GT Interactive
Mah Jong 64	Koei
Maho Seiki Eruteiri	Imagineer
Mario Kart 64	Nintendo
Mortal Kombat Trilogy	GT Interactive
Morita Shogi	Seta
Namco Baseball	Namco
NBA Hang Time	GT Interactive
Pebble Beach Golf Links	T&E
Pod	UbiSoft
Power League 64	Hudson
Power Pro Baseball	Konami
Pro King Baseball	Athena
Red Baron	Sierra
Robotron X	GT Interactive
Saikyo Habu Shogi	Seta
Smurfs 64	Infogrames
Soccer 64	Hudson Soft
Sonic Wings Assault	Video System
St Andrews Golf	Seta
Super Mario RPG 2	Nintendo
Super Real Island	Seta
Super Robot Spirits	Banpresto
Tales of Fantasia 64	Namco
Tetrisphere	H_2O
Ultra Combat	GT Interactive
Ultra Descent	Interplay
VR Baseball	Interplay
VR Golf	Interplay
Wet Corpse	Vic Tokai
Wonder Project J2	Enix
World Championship Wrestling	T•HQ
XSW1	Video System
64 Ozumo	Bottom Up

Nintendo is beginning to look untouchable once more, as sales of the N64 eclipse the Saturn and close in on the all-conquering PlayStation. The initial doubts over thirdparty support are fast fading thanks to quality titles such as Acclaim's *Turok* and Konami's *Perfect Striker* and, though there are still those who doubt the durability of the cartridge format, there can be few developers who wouldn't want to get their hands on a dev kit. As Nintendo continues to update its considerable back catalogue of classics for the 64bit market, a healthy future looks assured. With favourites such as *Castlevania*, *Contra* and *Metroid* rumoured to already be in development, it would be a brave man indeed that would predict anything but eventual global success for the Nintendo 64. The defection of Enix and Square to the PlayStation has certainly taken the shine off the impending 64DD launch, but Nintendo has, in *Zelda 64*, a game capable of single-handedly ensuring the peripheral's success, in the same way *Super Mario 64* assured the base N64 unit a place in millions of homes. The future is almost here...

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